A Current Educational Bulletin For Submitting Law Enforcement Agencies

A Closer Examination From The Benchtop...

Under the Scope

Missouri State Highway Patrol • Crime Laboratory Division

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FYI

Please contact our clerical staff to arrange for an appointment before coming to the lab for evidence submittal.

All issues are available on our website: *www.mshp.dps.mo.gov* At the home page, go to Patrol Divisions → Crime Laboratory → Publications → Show/Hide Other

Please do not use powder to develop latent prints on porous items, such as paper. The success rate of developing prints with powder on such items is very slim. In the lab, the criminalists use a chemical (ninhydrin) which is suited for such evidence. Always remember to wear gloves when handling any type of evidence, especially for prints.

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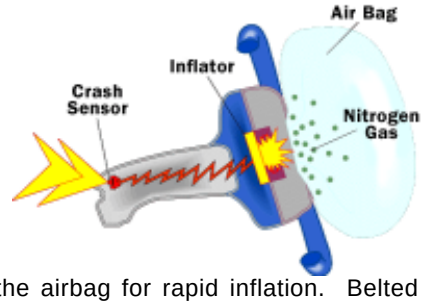
Airbag Evidence Can Impact Accident Investigations

Traffic crash investigations are a common part of most officer's duties. The routine minor crash may not be too difficult to investigate. Some crash investigations, though, may be somewhat more complex. For instance, consider a one vehicle crash involving a fatality and an intoxication. Upon arriving at the scene, the officer discovers a roll-over, frontal impact crash with two ejected subjects. One person is fatally injured; another is apparently intoxicated, but alive. The survivor claims he was the passenger, but the officer suspects he was actually the driver. How do you resolve this issue? More importantly, how do you prove it in court? Forensic science may be able to assist investigators in determining certain occupant locations in the vehicle.

Hair and blood transfer to vehicle windshields and dashboards are indicators of where a person *MAY* initially have been seated. But, this evidence must be interpreted with caution. As vehicle occupants (especially when unbelted) tumble during the upheaval of a collision and/or roll-over, hair and blood may get transferred throughout the interior of the cabin. An investigator must recognize that an injured passenger could potentially impart blood on the driver side airbag, falsely indicating that the passenger was actually the driver. Therefore, rather than relying on traditional DNA or hair exams, the investigator should consider alternative airbag evidence.

Since the mid 1990s, all new vehicles are required to have driver and passenger airbags. Airbags are designed as a passive secondary restraint system and are deployed within 1/20th of a second of a rapid deceleration. During an impact, the crash sensor ignites a detonator which contains sodium azide, an impact-sensitive explosive similar to the solid rocket booster fuel in the space shuttle. When sodium azide is activated, it releases large quantities of hot nitrogen gas (600-700 degrees F). The hot gas



fills the airbag for rapid inflation. Belted and unbelted occupants commonly contact the airbags with their chest, face, and arms. Additionally, unbelted occupants may make contact with their abdomen and legs, as well. Once the airbags have deployed, they must quickly deflate (within 0.3 second), which occurs as the hot gas escapes through the vent holes and seams of the bag. The escape of hot gas often leaves burns on the objects it contacts, with skin and/or clothing being of particular interest to forensic scientists.

Several differences exist between the driver side and the passenger side airbag, which may aid the investigator in determining the correct airbag a certain occupant contacted. The driver's side bag is round, fits in the steering column, and

is often coated with starch or talcum powder to prevent its neoprene lining from sticking together while in storage. The passenger side bag is rectangular, emerges out of the dash, and is not packed with starch. With this in mind, the Trace

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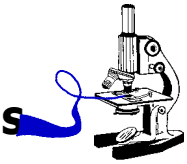


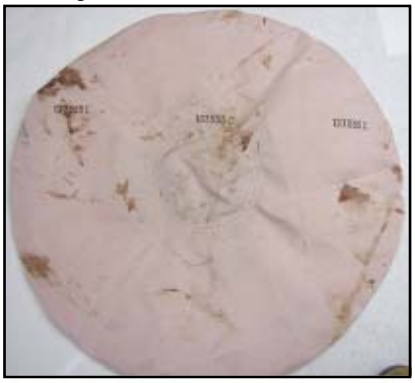
criminalists can examine occupant clothing for singe marks and/or the presence of starch. The singe marks imparted by the seams of the round driver's side bag should be in an arch pattern, while the passenger side bag marks should be straight. The presence of starch or talcum powder is indicative of contact with the driver side airbag, whether from being in the driver's seat during initial impact, or from the occupants tumbling throughout the vehicle's interior after impact. In addition to the transfer of evidence from the airbag to the occupant's skin and clothing, transfer of evidence (such as cosmetics) from the occupants to the airbags, may also occur.

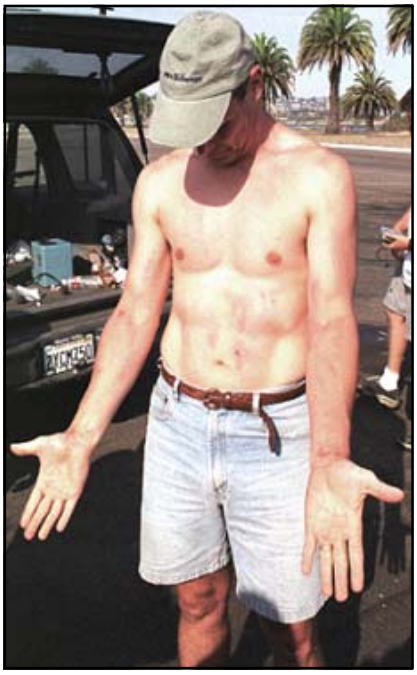
When submitting evidence to the lab, the investigator should keep several points in mind. Examinations of the airbags and of the occupant's clothing may reveal transfers of blood, hair, fiber, make-up, starch, burn marks and possibly glass. Therefore, the investigator should submit the deployed airbags in their entirety (no cuttings) as well as clothing and standards (both hair and DNA) from all the occupants. Additionally, submit a glass standard if shattered glass is present on the clothing. Collect any hair embedded in the windshield or dash, and use sterile swabs to collect any relevant blood spatters. As with any accident reconstruction, it is important to state on the evidence (such as clothing or standards) from whom the evidence was taken or from what part of the vehicle evidence was recovered. Package each piece of evidence separately in properly sealed containers, and specify any exams requested.

A Final Note—Investigators may not be fully aware of the largely unexplored area of airbag examination in crash investigations. Blood, hair, tissue, and DNA may be able to associate certain occupants with a particular vehicle, but Trace evidence may ultimately determine who was actually in the driver or passenger seat at the exact time of a collision where airbags were deployed. The investigator must also keep the science in proper perspective: sometimes, a crash may not yield any probative evidence.

Further information and assistance is available for your investigation; please contact any criminalist of the Trace evidence section.

Blood may not be the best indicator in determining multiple occupant locations in a vehicle, especially if unbelted occupants have tumbled around the cabin (below). In such instances, the investigator should further examine the scene for additional Trace evidence, such as clothing.

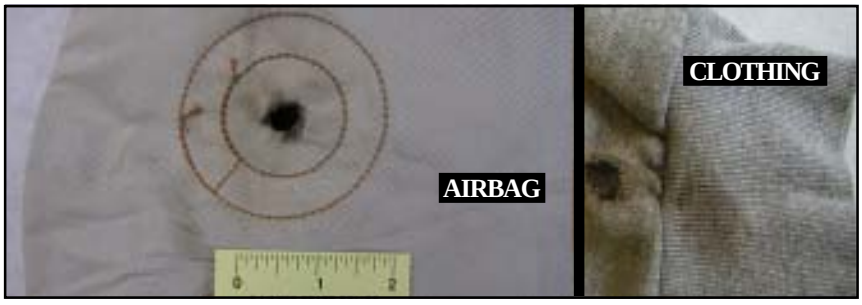




Airbags are designed to be inflated for only a short period of time, so they are not airtight. Extremely hot nitrogen gas exits an airbag and can singe clothing and skin. Abrasions to arms and thermal burns to the driver's arms occur from holding a steering wheel during an airbag deployment (right).

Singe marks imparted in clothing appear as small dots or smears (right).

Vent holes are designed in the airbag to allow hot nitrogen gas to escape. However, hot gas can also vent through the seams in the front of the airbag. If clothing comes into contact with a maximum inflated airbag, the hot gas can cause singe patterns characteristic of the seam patterns, which appear as a series of small dots or smears. Stitching patterns can vary from one airbag to another, by make, model, and year, thereby yielding class characteristics.



Singe marks from hot gases escaping from vent holes (left) impart a burn pattern on an occupant's shirt wrist area (right). Singes occur mainly on upper torso and arm areas of clothing of restrained occupants, and on lower torso area of clothing of unrestrained front seat occupants.

Glenn Schubert, Illinois State Police, provided some facts and photos for this article.